

# A NOVEL POLYMER BASED ANTIMICROBIAL COATING WITH EMBEDDED COPPER OR COPPER SALT PARTICLES

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**Abstract:** This research is to develop a composite coating which can provide good antimicrobial property and compatibility with none-metallic substrates. The paper reports an innovative polymer based coating system containing mixtures of fine particles of copper (Cu) and Cu salt. This composite coating was obtained by an aqueous colloid paste which is formed by mixing fine particles of Cu and Cu salt (Cu sulphate and Cu chloride) with epoxy resin Nuplex K36. Atom absorption spectroscopy was used to measure the concentration of Cu ion which is released from the coatings. The antimicrobial properties were studied by bactericidal test against *Escherichia coli* (*E. coli*) ATCC25922. Transmission electron microscopy (TEM) was performed to characterize the change of *E. coli* after contacting with the coatings. Synchrotron Infrared microscope (SR-IRM) was used to in-situ and in-vivo study the impact of Cu ions on bacteria. The coating with embedded fine Cu salt showed higher antimicrobial property than the coating with Cu due to releasing more Cu ions. Single bacterial cell membrane changes can be clearly identified by combining TEM and SR-IRM technique, which provide an explanation of the mechanism of Cu coating antimicrobial property.